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Cleveland, Ohio 44114
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Project name:
Whiskey Island Feasibility Study

Project ref:
AECOM PN 60581121

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Date:
December 16, 2019

Technical Memo

Subject: City of Cleveland – South Whiskey Island Feasibility Study
Noise Analysis, Phase 1, Existing Conditions.

1. Introduction and Project Description

This memo summarizes a technical noise analysis for existing conditions in the area of a proposed bridge replacement project to be located around South Whiskey Island in Cleveland Ohio. This memo provides a summary of Phase 1 of the noise analysis, which includes a noise measurement survey of the project area and traffic noise modeling for existing conditions. A future noise analysis phase will model traffic noise associated with future build alternatives, assess potential noise impacts from the project and evaluate potential noise mitigation elements for reasonableness and feasibility in accordance with applicable standards.

The noise analysis area consists of the residential area across Old River channel from South Whiskey Island, generally bounded by Center Street on the North, River Road on the West, and the Cleveland Memorial Shoreway elevated highway (US 20, SR-2) on the east and south. An aerial view of the area, including preliminary locations for future potential bridge alternatives, is shown in **Figure 1.**

The project may include a new bridge crossing from the Southern shore of the Old River to South Whiskey Island. Potential crossing sites include the western terminus of Elm Ave; the terminus of Mulberry Ave; a fixed bridge commencing near the terminus of Washington Avenue and spanning over the intersection of Division Ave and River Rd; and a fixed bridge commencing at the West 45th St interchange with the Shoreway. These alignments could alter existing traffic patterns in the area and potentially create an increase in noise at neighboring properties. Noise-sensitive receptors (NSRs) in proximity of the project consist of a neighborhood of multi-family homes south of Mulberry Avenue, referred to locally as Lakeview Terrace housing.

A noise model was developed for the area using the Federal Highway Administration's (FHWA) Traffic Noise Model (TNM, version 2.5), with noise levels being predicted at NSRs in the neighborhood. Sound Level Measurements were taken in the field in order to document existing sound levels and to validate the noise model. Non traffic-related noise sources (such as sounds from a nearby Elm Avenue cement terminal, and industrial noise sources and rail activity from Whiskey Island) were also documented, as TNM does not include these noise sources in the predicted traffic-related noise levels.

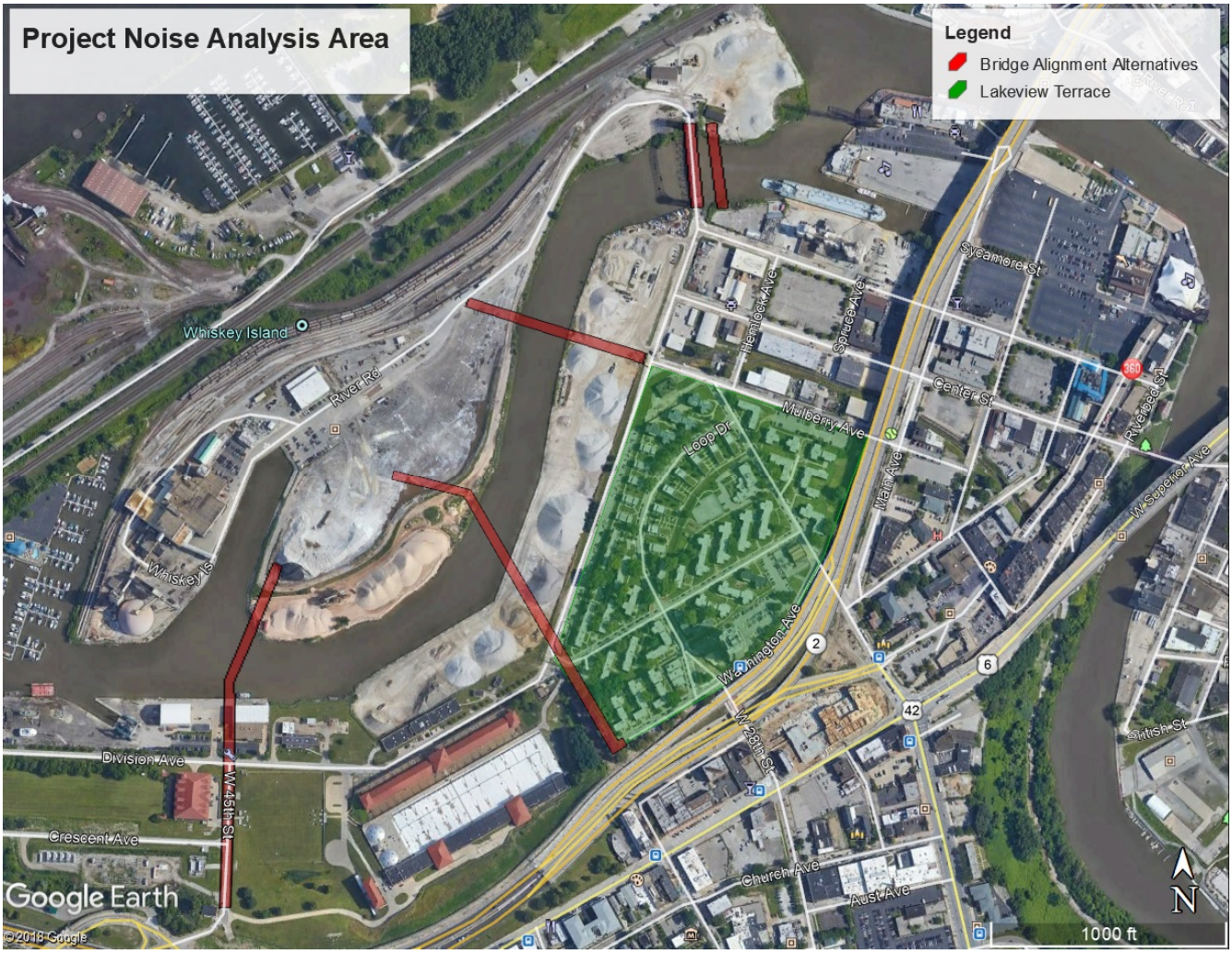


Figure 1. Project Area.

2. Existing Conditions

2.1 Nearby Noise-Sensitive Land Uses

The Project site is in proximity to multiple NSRs, consisting of residential land use. The nearest residential properties are multi-family homes in the neighborhood bounded by Mulberry Avenue, the Memorial Shoreway, and the Garrett A. Morgan Water Treatment facility.

2.2 Noise Measurements

All noise measurements for this project are reported in A-weighted Decibels, Leq, as defined below:

A-Weighted decibels (noted as dBA) represent an adjustment or weighting of sound frequencies to approximate the way that the average person hears sounds. This weighting system assigns a weight that is related to how sensitive the human ear is to each sound frequency. Higher and lower frequencies that are less sensitive to the human ear are weighted less than those for frequency ranges to which the ear is more sensitive.

Leq, or Equivalent Sound Level, indicates the equivalent, steady-state sound level. In a stated period of time, the steady-state sound level, contains the same acoustic energy as the time-varying sound level during the same period. This is also referred to as the energy-averaged sound level over a specific time period. The TMN always predicts noise levels as the 1-hour Leq, dBA. **Table 1** contains typical A-weighted noise levels for common indoor and outdoor activities.

Table 1. Typical Indoor and Outdoor Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: Caltrans 2013.

All noise measurements were conducted with a laboratory-calibrated, American National Standards Institute (ANSI) Type 1 Sound Level Meter, within manufacturer's recommended calibration period. Measurements were conducted on October 7-8, 2019 for model validation at areas representative of noise-sensitive land uses. All measurements were conducted under appropriate meteorological conditions (e.g., no precipitation, calm winds, moderate temperatures). Noise measurement field data sheets are provided in **Attachment A**. Photographs of noise measurement set-ups are provided in **Attachment B**. Instrumentation calibration records are kept on file and are available upon request. **Attachment C** includes tabular noise measurement data. Data in this section shows 1-minute Leq values plus cumulative Leq values for each minute of each short-term measurement location.

Noise measurements were conducted for two reasons: First to use as a basis for validating the TNM model runs for existing conditions (and eventually to be used to predict noise for future proposed alternatives), and second to document noise levels in areas that are not dominated by traffic noise sources. Noise measurements were conducted at five separate representative locations within the project study area to represent a variety of NSRs. **Table 2**, below, contains a summary of the locations and noise levels measured during the site visit.

The locations of these measurements are provided in **Figure 2** below. Short term measurements were conducted at midday periods when traffic conditions are free flowing for validation of the TNM model runs.

Locations ST-2, ST-3, and ST-5 were selected in order to validate the TNM run. ST-1 was selected to document the non-traffic noise generated by the Lafarge cement terminal on Elm Street. ST-4 was selected to document non-traffic noise generated by rail activity and loading activity across the river on Whiskey Island. The long-term measurement was conducted to help identify the noise level variation over the course of the day and to help estimate noise levels at the short-term locations during different times of day.

Table 2. Noise Measurement Summary

Receptor Information			Measurement Results*		
ID	**Location**	**Observed Dominant Noise Sources**	**Start Time**	**End Time**	**Level (Leq, dBA)**
LT-1	Parking Lot, Center St	Traffic on Center St and Elm Ave, sound from Lafarge cement terminal	4:12 PM Oct 7th, 2019	3:20 PM Oct 8th, 2019	47-76
ST-1	Parking Lot, Center St	Sound from Lafarge cement terminal (no significant traffic noise)	12:00 PM	12:17 PM	72.7
ST-2	Mulberry Ave	Traffic on Mulberry Ave	12:50 PM	1:27 PM	66.7
ST-3	Parking lot off Washington Ave	Traffic on Washington Ave and Highway 2	1:34 PM	1:50 PM	62.8
ST-4	River Road and Division Ave	Material loading activity and rail movements across River (no significant traffic noise), representative of homes on River Road.	2:26 PM	2:42 PM	55.2
ST-5	Washington Ave and W 28th St	Traffic on Washington Ave and Highway 2	2:47 PM	3:04 PM	59.6

*Measurements were conducted for roughly 15 minutes each,1-minute Leq intervals, A-weighted, using slow response. Reported level is the Leq (15 min)

The results in **Table 2** indicate higher levels for those areas near busy roadways, such as elevated SR-2 and the cement terminal on Elm street. The measured level at ST-4, which is representative of the first row of homes on River Road, was primarily dominated by industrial and rail activity on Whiskey Island and much less influenced by traffic generated noise as this location was further from busy roadways.

Figure 2. Noise Measurement Locations

A summary of the traffic counted during the short-term noise measurements normalized to one-hour is provided in **Table 3**. Traffic volumes are reported as normalized hour volumes used in the TNM validation runs. Traffic counts were split into three categories: Automobiles and Light trucks, Medium Trucks (2-axles, 6 tires), and Heavy Trucks (more than 2 axles).

Table 3. Noise Measurement Traffic Summary

Measurement Location	Modeled Roadway	Hourly Traffic Volume (Auto/MT/HT)	Estimated Speed, MPH (Auto/MT/HT)
ST-1	SR-2 EB	708/48/12	60/60/60
	SR-2 WB	900/24/12	60/60/60
ST-2	Mulberry EB	0/0/0	NA
	Mulberry WB	0/0/25	0/0/30
	SR-2 EB	652/40/10	60/60/60
	SR-2 WB	826/22/10	60/60/60

Measurement Location	Modeled Roadway	Hourly Traffic Volume (Auto/MT/HT)	Estimated Speed, MPH (Auto/MT/HT)
ST-3	Washington St EB	160/36/15	40/30/30
	Washington St WB	180/40/10	40/30/30
	SR-2 EB	644/38/10	60/60/60
	SR-2 WB	790/24/10	60/60/60
ST-4	No Traffic	NA	NA
ST-5	SR-2 EB	700/35/20	60/60/60
	SR-2 WB	880/20/16	60/60/60
	Washington St EB	160/30/15	40/30/30
	Washington St WB	188/34/10	40/30/30

Note: Auto = automobiles and light trucks, MT = medium trucks, HT = heavy trucks

The long-term noise measurement data (collected over a continuous period of approximately 21 hours) is presented graphically in **Figure 3**. The presented variation in the data indicates that the loudest part of the measurement period was observed between 8 AM and 12 PM with hourly Leq values of 72 dBA.

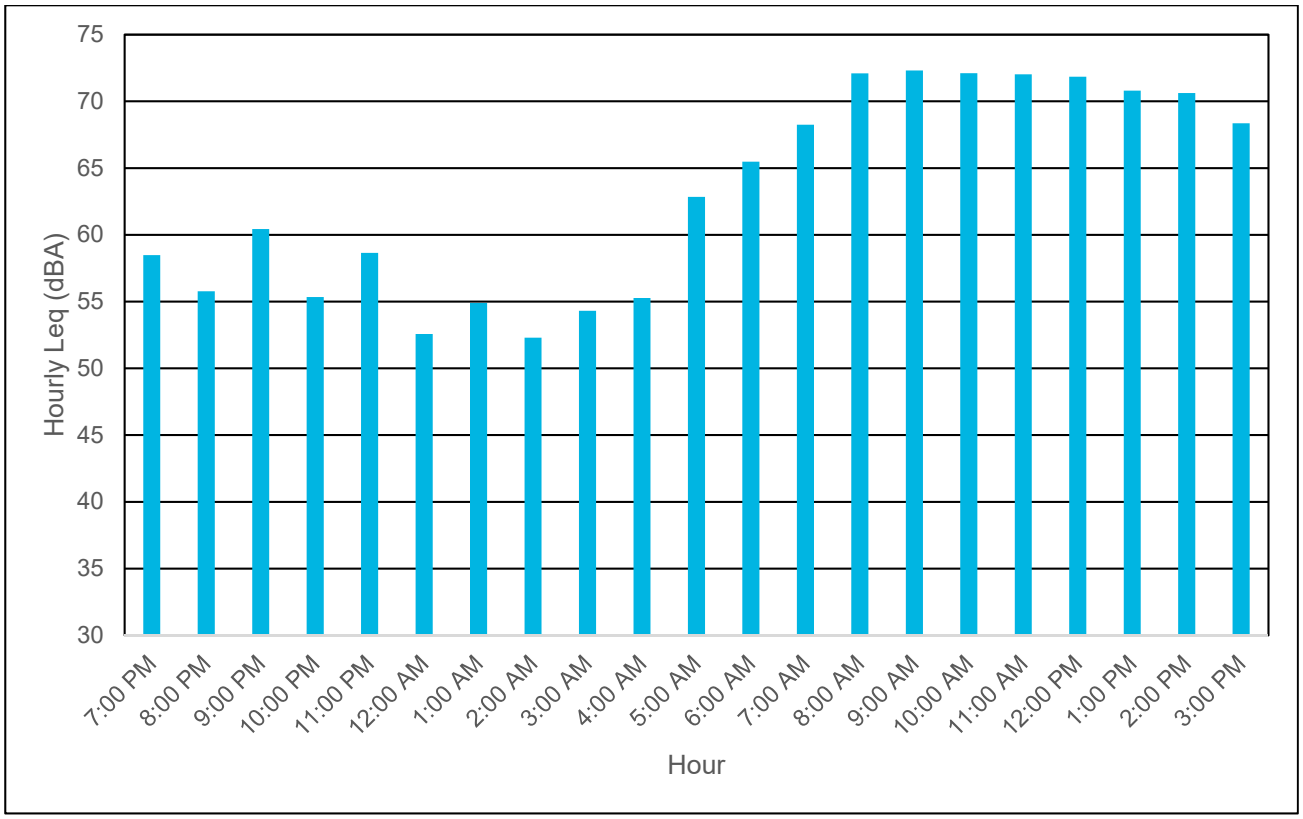


Figure 3. Long-Term Hourly Leq Values.

3. Noise Prediction Methodology

3.1 Noise Modeling Procedures

Traffic noise modeling was conducted using the FHWA Traffic Noise Model (TNM) version 2.5, which was the most current version available at the time of the analysis. The TNM model runs developed for this project included project roadways, representative receiver locations, and noise barriers to represent existing walls and structures. No future noise barriers were considered during this initial analysis. Each of the roadway segments include roadway and traffic attributes including roadway width and pavement type and hourly traffic volumes for autos, medium trucks and heavy trucks with average vehicle speeds for each.

3.2 Noise Model Validation

The results of the TNM validation is summarized in **Table 4**. Traffic noise model validation is the process of testing the accuracy of each modeled area by comparing the actual measured noise level to the predicted levels. This includes traffic conditions observed during the noise measurement from traffic counts videotaped during the noise measurements or first hand by the noise specialist. Traffic noise models are considered to be validated if the measured and predicted noise levels are within a 3-dBA margin of error. ST-2, ST-4, and ST-5 were used for model validation, as they are representative of the area containing NSRs. Measurement locations ST-1 and ST-4 were not validated, as the noise environmental at these locations were not currently dominated by traffic noise. The remaining measurement locations were all successfully validated against the TNM model.

Table 4. Noise Model Validation Summary

Measurement Location	Measured (Leq, dBA)	Predicted (Leq, dBA)	Predicted-Measured (Leq, dBA)	Result*
ST-1	72.7	48.4	-24.3	Non-Traffic Noise
ST-2	66.7	66.4	-0.6	Validated
ST-3	62.8	63.6	0.5	Validated
ST-4	55.2	32.1	-23.1	Non-Traffic Noise
ST-5	59.6	57.3	-2.3	Validated

* At measurement locations ST-1 and ST-4 traffic noise was not the dominant noise source (as noted in Table 2)

3.3 Existing Traffic and Roadway Inputs

Traffic data for TNM runs were developed from traffic counts made during the site visit in October 2019. Data from the Long-Term measurement (shown in **Figure 3**) indicate that the loudest hour of the day was from 9:00 AM to 10:00 AM. Traffic counts during this time period were used as inputs to assess existing traffic noise. The equivalent noise level for the loudest hour of the day (Leq(1-hr)) is the noise metric used by FHWA and ODOT to assess traffic noise impacts.

3.4 Modeled Receiver Locations

Modeled receiver locations are shown in **Figure 4**. The traffic noise model included modeled receiver locations for each multi-family complex within the project area. Existing structures, barriers, and topography were also included.

Figure 4. Modeled Noise Receiver Locations

4. Noise Prediction Results

4.1 Existing Conditions

Table 5 contains the traffic data inputs (number of autos, medium trucks, heavy trucks per hour and speed) that were used for the TNM model run for existing loudest hour conditions.

Table 5. TNM Traffic Inputs, Existing Loudest Hour

Modelled Roadway	Hourly Traffic Counts	Traffic Speeds
	Autos/Medium Trucks/Heavy Trucks	Autos/Medium Trucks/Heavy Trucks
SR-2 EB Outside Lane	236/16/4	60/60/60
SR-2 EB Middle Land	236/16/4	60/60/60
SR-2 EB Inside Lane	236/16/4	60/60/60
SR-2 WB Inside Lane	300/8/4	60/60/60
SR-2 WB Middle Lane	300/8/4	60/60/60
SR-2 WB Outside Lane	300/8/4	60/60/60
Mulberry EB	0/0/25	0/0/25
Mulberry WB	0/0/25	0/0/25
Washington EB	180/40/10	30/30/20
Washington WB	180/40/10	30/30/20

Table 6 provides the TNM -predicted loudest hour traffic noise levels at each receiver position. A number of these receivers were located far enough away from SR-2 that the traffic noise was not the dominant noise source at those locations. These locations are noted in the table as their actual sound levels are likely greater than what was predicted in TNM, which only predicts traffic noise.

Table 6. Predicted Noise Levels, Existing Conditions

ID	Land Use	Predicted Level $L_{eq(1\text{-}hr)}$, dBA	Dominated by traffic noise?
R001	Multi-family Apartment Building	62.3	Yes
R002	Multi-family Apartment Building	56.2	Yes
R003	Multi-family Apartment Building	57.8	Yes
R004	Multi-family Apartment Building	56.9	Yes
R005	Multi-family Apartment Building	53.8	Yes
R006	Multi-family Apartment Building	50.5	Yes
R007	Community Center	50.2	Yes
R008	Basketball Court	40.1	No
R009	Multi-family Apartment Building	57.3	Yes
R010	Multi-family Apartment Building	54.5	Yes
R011	Multi-family Apartment Building	53.2	Yes
R012	Multi-family Apartment Building	50.8	Yes
R013	Multi-family Apartment Building	47.5	No

ID	Land Use	Predicted Level $L_{eq(1\text{-}hr)}$, dBA	Dominated by traffic noise?
R014	Multi-family Apartment Building	45.0	No
R015	Multi-family Apartment Building	58.7	Yes
R016	Multi-family Apartment Building	58.6	Yes
R017	Multi-family Apartment Building	55.9	Yes
R018	Multi-family Apartment Building	52.1	Yes
R019	Multi-family Apartment Building	49.8	Yes
R020	Multi-family Apartment Building	39.8	No
R021	Multi-family Apartment Building	36.2	No
R022	Multi-family Apartment Building	57.9	Yes
R023	Multi-family Apartment Building	66.6	Yes
R024	Multi-family Apartment Building	56.7	Yes
R027	Multi-family Apartment Building	35.4	No
R028	Multi-family Apartment Building	34.3	No
R029	Multi-family Apartment Building	34.1	No
R030	Multi-family Apartment Building	38.0	No
R031	Multi-family Apartment Building	39.9	No
R032	Multi-family Apartment Building	43.4	Yes
R033	Multi-family Apartment Building	46.3	Yes
R034	Multi-family Apartment Building	49.6	Yes
R035	Multi-family Apartment Building	54.1	Yes
R036	Multi-family Apartment Building	43.9	Yes
R037	Multi-family Apartment Building	41.2	No
R038	Multi-family Apartment Building	35.9	No
R039	Multi-family Apartment Building	36.8	No
R040	Multi-family Apartment Building	35.7	No
R041	Multi-family Apartment Building	35.4	No
R042	Multi-family Apartment Building	34.6	No
R043	Multi-family Apartment Building	28.8	No
R044	Multi-family Apartment Building	31.5	No
R045	Multi-family Apartment Building	25.7	No
R046	Multi-family Apartment Building	37.8	No
R047	Multi-family Apartment Building	40.9	No
R048	Multi-family Apartment Building	55.9	Yes
R049	Multi-family Apartment Building	54.6	Yes

In reviewing the prediction traffic noise results in **Table 6**, it should be noted that TNM only predicts traffic related noise, which for this area would include traffic on SR-2, Mulberry Avenue and Washington Avenue. Those modeled receiver locations closer to these roadways would be expected to have higher predicted noise levels than receivers farther away.

5. Summary and Next Steps

This memo summarizes existing condition noise measurements, noise model validation and prediction of existing traffic noise levels in the project area. Predicted traffic noise levels generally ranged from the mid-30 dBA to mid-60 dBA mostly depending on the relative distance to elevated SR-2 and other local roadways. Once alternatives for bridge replacement are selected, the next steps of the Noise Study could include prediction of noise levels associated with future build alternatives, assessment of potential noise impacts, evaluation of noise mitigation if required, and documentation in a final memorandum or report in accordance with applicable policy.

Attachment A. Field Data Sheets

This attachment includes copies of the field data sheets used to document noise measurement locations and conditions during those measurements.

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Whiskey Island Project #: _____ Date: 10-7-19 Page _____ of _____

Measurement Location: LT1 Analyst: Schad

Sound Level Meter
Model #: LD 820
Serial #: _____
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen: Yes / No (explain)

Field Calibration
Model #: CAL200
Serial #: 5768
Calibration Level (dB): 94 / 114
Pre-Test +0.15 dBA
Post-Test −0.06 dBA

Meteorological Data
Model #: _____ Time Obs/Meas: _____
Serial #: _____
Precipitation: Yes (explain) / No
Wind: Steady / Gusty / Calm
Avg Wind Speed/Direction: _____ m/s / MPH
Temp (°F): _____ RH (%): _____
Bar Psr (Hg): _____ Cloud Cover (%): _____

Topo: Flat / Hilly
Terrain: Hard / Soft / Mixed / Agg / Snow

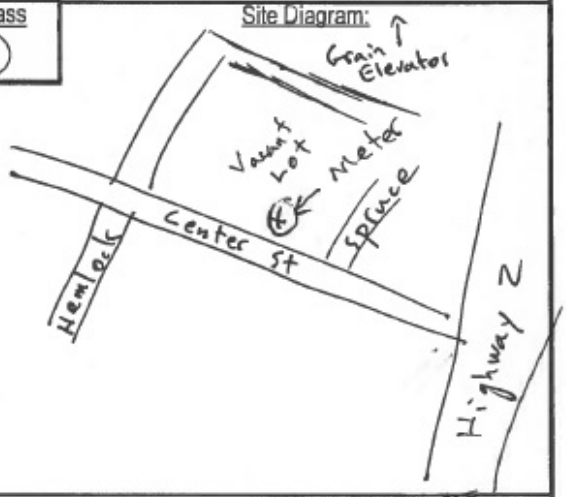
GPS Coordinates (at SLM location)#
41°29'45.3"N 81°42'31.7"W

Loc. ID	Start Time (hh:mm)	Stop Time (hh:mm)	Metrics L_{eq}	Metrics L_{min}	Metrics L_{max}	Statistics L_{10}	Statistics L_{50}	Statistics L_{90}	Notes/Events
LT1	18:12								Started Meter on 10-7-19
LT1	~~18:12~~	15:20							Stopped Meter on 10-8-19

Roadway Name/Dir.	From	Wideo cameras
Speed (post/obs*)		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass (N)

Site Diagram:



- note coordinate system if other than NAD84 * - Speed estimated by Radar / Driving / Observation

Photos Taken? (Yes) / No

Additional Notes/Comments: Significant noise from grain elevator

Noise Sources (circle all that apply): distant aircraft/roadway traffic/rail ops/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects/mechanical

Additional Notes and Sketches on Reverse or Indicated Separate Sheet(s)

AECOM ANCP, Field Noise Measurement Form, Vers. 1.4 rev010918

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Whiskey Island Project #: _____ Date: 10-8-19 Page _____ of _____

Measurement Location: ST1 Analyst: _____

Sound Level Meter
Model #: LxT1
Serial #: 2527
Weighting: (A) / C / Flat
Response: Slow / (Fast) / Impl
Windscreen: (Yes) / No (explain)

Field Calibration
Model #: CAL200
Serial #: 5768
Calibration Level (dB): 94 (114)
Pre-Test -0.02 dBA
Post-Test +0.08 dBA

Meteorological Data
Model #: _____ Time Obs/Meas: _____
Serial #: _____
Precipitation: Yes (explain) / No
Wind: Steady / Gusty / Calm
Avg Wind Speed/Direction: _____ m/s / MPH
Temp (°F): _____ RH (%): _____
Bar Psr (Hg): _____ Cloud Cover (%): _____

Topo: (Flat) / Hilly
Terrain: (Hard) / Soft / Mixed / Agg / Snow

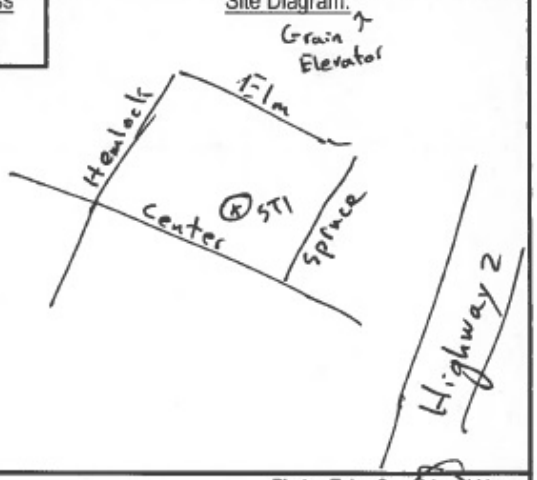
GPS Coordinates (at SLM location)#: 41°29'45.3"N 81°42'31.7"W

Loc. ID	Start Time (hh:mm)	Stop Time (hh:mm)	Metrics L_{eq}	L_{min}	L_{max}	Statistics L_{10}	L_{50}	L_{90}	Notes/Events
ST1	12:00								Start
		12:17							End

Roadway Name/Dir.	From	Cameras
Speed (post/obs*)		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass (N)

Site Diagram:



- note coordinate system if other than NAD84 * - Speed estimated by Radar / Driving / Observation

Photos Taken? (Yes) / No

Additional Notes/Comments: Noise from Grain El
Traffic all trucks on Center + Elm
No NSAs, not modelled

Noise Sources (circle all that apply): distant aircraft/roadway traffic/rail ops/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects/mechanical

Additional Notes and Sketches on Reverse or Indicated Separate Sheet(s)

AECOM ANCP, Field Noise Measurement Form, Vers. 1.4 rev010918

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Whiskey Island | Project #: | Date: 10-8-19 | Page of

Measurement Location: ST2 | Analyst: Schad

Sound Level Meter
Model #: LxT1
Serial #: 2527
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen: Yes / No (explain)

Field Calibration
Model #: CAL200
Serial #: 5768
Calibration Level (dB): 94 / 114
Pre-Test +0.10 dBA
Post-Test -0.02 dBA

Meteorological Data
Model #: | Time Obs/Meas:
Serial #:
Precipitation: Yes (explain) / No
Wind: Steady / Gusty / Calm
Avg Wind Speed/Direction: m/s / MPH
Temp (°F): RH (%):
Bar Psr (Hg): Cloud Cover (%):

Topo: Flat / Hilly
Terrain: Hard / Soft / Mixed / Agg / Snow

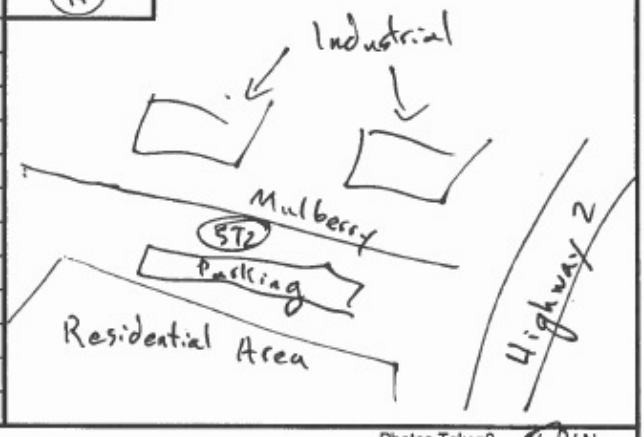
GPS Coordinates (at SLM location)*
41°29'41.0"N 82°42'31.5"W

Loc. ID	Start Time (hh:mm)	Stop Time (hh:mm)	Metrics L_{eq}	L_{min}	L_{max}	Statistics L_{10}	L_{50}	L_{90}	Notes/Events
ST2	12:50	13:28							start + stop

Roadway Name/Dir.	Mulberry	
Speed (post/obs*)	25 mph	
Number of Lanes	2	
Width (pave/row)		
1- or 2- way	2 way	
Grade	Flat	
Bus Stops		
Stoplights	None	
Motorcycles		
Automobiles	0	
Medium Trucks	0	
Heavy Trucks	6 west	6 east
Buses		
Count duration	15	

compass (N)

Site Diagram:



- note coordinate system if other than NAD84 * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes / No

Additional Notes/Comments: Traffic all trucks

Noise Sources (circle all that apply): distant aircraft/roadway traffic/rail ops/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects/mechanical

Additional Notes and Sketches on Reverse or Indicated Separate Sheet(s)

AECOM ANCP, Field Noise Measurement Form, Vers. 1.4 rev010918

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Whiskey Island | Project #: | Date: 10-8-19 | Page of

Measurement Location: ST3 | Analyst: Schad

Sound Level Meter
Model #: LxT1
Serial #: 2527
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen: Yes / No (explain)

Field Calibration
Model #: CAL200
Serial #: 5768
Calibration Level (dB): 94 / 114
Pre-Test +0.03 dBA
Post-Test +0.06 dBA

Meteorological Data
Model #: | Time Obs/Meas:
Serial #:
Precipitation: Yes (explain) / No
Wind: Steady / Gusty / Calm
Avg Wind Speed/Direction: m/s / MPH
Temp (°F): RH (%):
Bar Psr (Hg): Cloud Cover (%):

Topo: Flat / Hilly
Terrain: Hard / Soft / Mixed / Agg / Snow

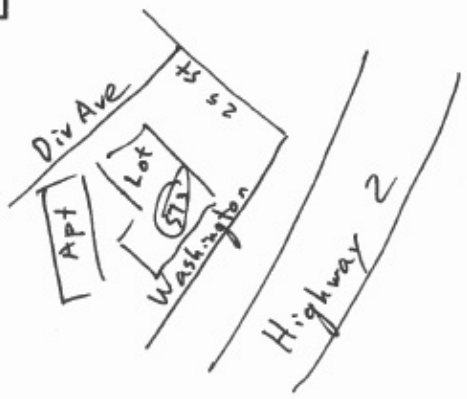
GPS Coordinates (at SLM location)#
41°29'34.1"N 81°42'33.1"W

Loc. ID	Start Time (hh:mm)	Stop Time (hh:mm)	Metrics L_{eq}	L_{min}	L_{max}	Statistics L_{10}	L_{50}	L_{90}	Notes/Events
ST3	13:34								start
ST3		13:50							stop

Roadway Name/Dir.	
Speed (post/obs*)	30 mph
Number of Lanes	2 lanes
Width (pave/row)	
1- or 2- way	all westbound
Grade	flat
Bus Stops	
Stoplights	
Motorcycles	
Automobiles	15
Medium Trucks	3
Heavy Trucks	1
Buses	
Count duration	5 min

compass (N)

Site Diagram:



- note coordinate system if other than NAD84 * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes / No

Additional Notes/Comments: Traffic may be detour related

Noise Sources (circle all that apply): distant aircraft/roadway traffic/rail ops/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects/mechanical

Additional Notes and Sketches on Reverse or Indicated Separate Sheet(s)

AECOM ANCP, Field Noise Measurement Form, Vers. 1.4 rev010918

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Whiskey Island Project #: _____ Date: 10-8-19 Page _____ of _____

Measurement Location: ST4 Analyst: S. Lab

Sound Level Meter
Model #: LxT1
Serial #: 2527
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen: Yes / No (explain)

Field Calibration
Model #: CAL200
Serial #: 5968
Calibration Level (dB): 94 / 114
Pre-Test +0.00 dBA
Post-Test +0.04 dBA

Meteorological Data
Model #: _____ Time Obs/Meas: _____
Serial #: _____
Precipitation: Yes (explain) / No
Wind: Steady / Gusty / Calm
Avg Wind Speed/Direction: _____ m/s / MPH
Temp (°F): _____ RH (%): _____
Bar Psr (Hg): _____ Cloud Cover (%): _____

Topo: Flat / Hilly
Terrain: Hard / Soft / Mixed / Agg / Snow

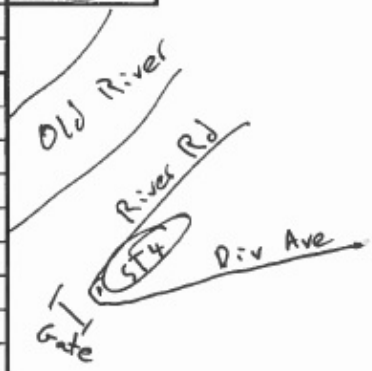
GPS Coordinates (at SLM location)#: 41°29'31.6" 81°42'45.5"W

Loc. ID	Start Time (hh:mm)	Stop Time (hh:mm)	Metrics L_{eq}	Metrics L_{min}	Metrics L_{max}	Statistics L_{10}	Statistics L_{50}	Statistics L_{90}	Notes/Events
	~~14:25~~								
	14:26								Start
		14:42							End

Roadway Name/Dir.	No Traffic	
Speed (post/obs*)		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



- note coordinate system if other than NAD84 * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes / No

Additional Notes/Comments: Taken to show noise from across River outside 500 ft zone

Noise Sources (circle all that apply): distant aircraft/roadway traffic/rail ops/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects/mechanical

Additional Notes and Sketches on Reverse or Indicated Separate Sheet(s)

AECOM ANCP, Field Noise Measurement Form, Vers. 1.4 rev010918

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Whiskey Island Project #: _____ Date: 10-8-19 Page _____ of _____

Measurement Location: ST5 Analyst: S. Chad

Sound Level Meter
Model #: LxT1
Serial #: 2527
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen: Yes / No (explain)

Field Calibration
Model #: CAL200
Serial #: 5768
Calibration Level (dB): 94 / 114
Pre-Test -0.10 dBA
Post-Test +0.02 dBA

Meteorological Data
Model #: _____ Time Obs/Meas: _____
Serial #: _____
Precipitation: Yes (explain) / No
Wind: Steady / Gusty / Calm
Avg Wind Speed/Direction: _____ m/s / MPH
Temp (°F): _____ RH (%): _____
Bar Psr (Hg): _____ Cloud Cover (%): _____

Topo: Flat / Hilly
Terrain: Hard / Soft / Mixed / Agg / Snow

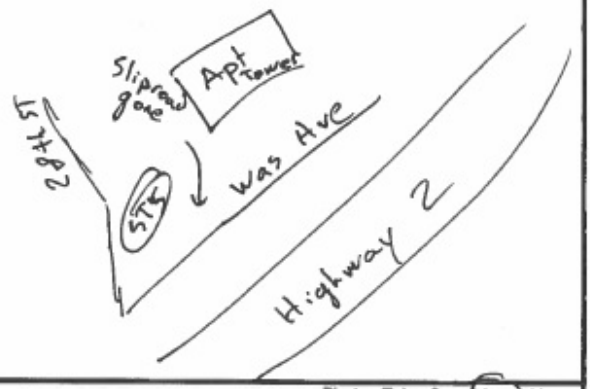
GPS Coordinates (at SLM location)*
41°29'30.5"N 81°42'37.9"W

Loc. ID	Start Time (hh:mm)	Stop Time (hh:mm)	Metrics L_{eq}	Metrics L_{min}	Metrics L_{max}	Statistics L_{10}	Statistics L_{50}	Statistics L_{90}	Notes/Events
ST5	14:47								Start
ST5		15:04							End
ST5	14:56	14:57							School Bus Stop

Roadway Name/Dir.	Was W	Was E
Speed (post/obs*)	30	30
Number of Lanes	1	1
Width (pave/row)		
1- or 2- way		
Grade	—	—
Bus Stops		
Stoplights		
Motorcycles		
Automobiles	40	47
Medium Trucks	7	8
Heavy Trucks	4	3
Buses	—	—
Count duration	15:00	15:00

compass (N)

Site Diagram:



- note coordinate system if other than NAD84 * - Speed estimated by Radar / Driving / Observation

Photos Taken? (Yes) / No

Additional Notes/Comments: Bus stop at 14:56

Slip road from Aerials not there, replaced w/ Park

Noise Sources (circle all that apply): distant aircraft/roadway traffic/rail ops/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects/mechanical

Additional Notes and Sketches on Reverse or Indicated Separate Sheet(s)

AECOM ANCP, Field Noise Measurement Form, Vers. 1.4 rev010918

Attachment B. Field Measurement Photos

Photograph 1

Date: 10/7/19

Comments:
LT1: Long Term Monitor 1

ST1: Set up Adjacent

Located near parking lot

N 41°29'45.3"
W 81°42'31.7"

Camera facing east

Photograph 2

Date: 10/07/19

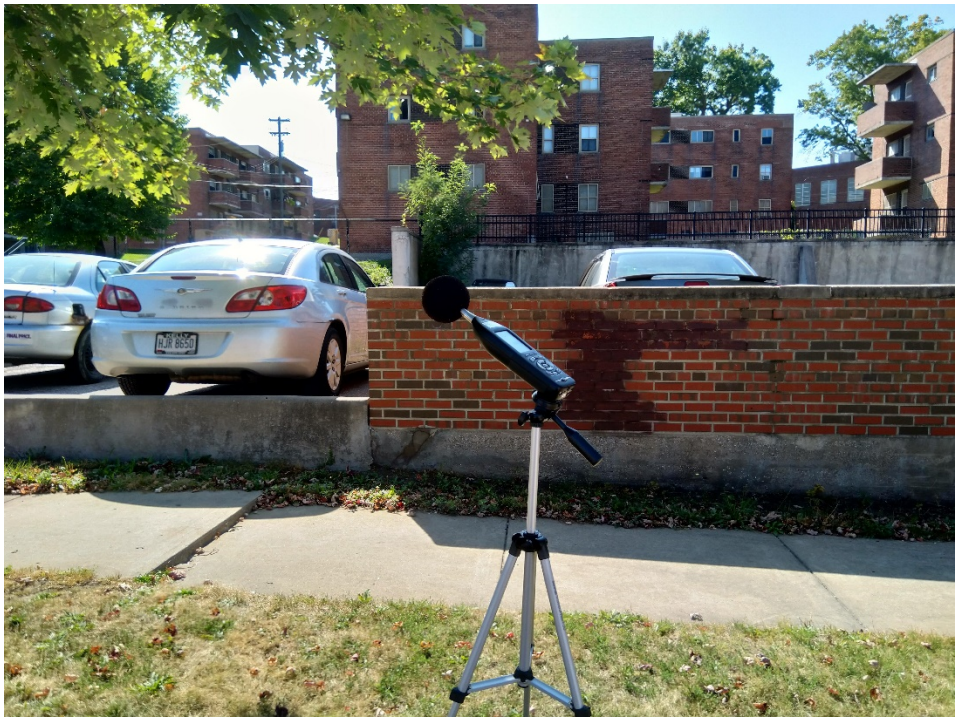
Comments:
LT1: Long Term Monitor 1

ST1: Set up adjacent

Located near parking lot

N 41°29'45.3"
W 81°42'31.7"

Camera facing South



Photograph 3

Date: 10/08/19

Comments:
ST2: Short Term Monitor 2

Located on Mulberry Ave next to Multi-Family Apartment

N 41°29'41.0"
W 81°42'31.5"

Camera facing West

Photograph 4

Date: 10/08/19

Comments:
ST2: Short Term Monitor 2

Located on Mulberry Ave next to Multi-Family Apartment

N 41°29'41.0"
W 81°42'31.5"

Camera facing South

Photograph 5

Date: 10/08/19

Comments:
ST3: Short Term Monitor 3

Located in Parking lot between Washington and Multi-Family Apartment

N 41°29'34.1"
W 81°42'33.1"

Camera facing South

Photograph 6

Date: 10/08/19

Comments:
ST3: Short Term Monitor 3

Located in Parking lot between Washington and Multi-Family Apartment

N 41°29'34.1"
W 81°42'33.1"

Camera facing South

	**Photograph 7** **Date:** 10/08/19 **Comments:** ST4: Short Term Monitor 4 Located at intersection of Division Ave and River Road N 41°29'31.6" W 81°42'45.5" Camera facing East
	**Photograph 8** **Date:** 10/08/19 **Comments:** ST4: Short Term Monitor 4 Located at intersection of Division Ave and River Road N 41°29'31.6" W 81°42'45.5" Camera facing North

Photograph 9

Date: 10/08/19

Comments:
ST5: Short Term Monitor 5

Located at intersection W 28th Street and Washington Ave

N 41°29'30.5"
W 81°42'37.9"

Camera facing South

Photograph 10

Date: 10/08/19

Comments:
ST5: Short Term Monitor 5

Located at intersection W 28th Street and Washington Ave

N 41°29'30.5"
W 81°42'37.9"

Camera facing North

Attachment C, Tabulated Field Measurement Data

	ST-1	
Time	Leq	Running Avg
12:00:00 PM	72.1	72.1
12:01:00 PM	72.1	72.1
12:02:00 PM	72.9	72.4
12:03:00 PM	72.3	72.4
12:04:00 PM	72.9	72.5
12:05:00 PM	73.2	72.6
12:06:00 PM	72.6	72.6
12:07:00 PM	72.8	72.6
12:08:00 PM	72.2	72.6
12:09:00 PM	71.9	72.5
12:10:00 PM	72.2	72.5
12:11:00 PM	72.5	72.5
12:12:00 PM	72.3	72.5
12:13:00 PM	74.7	72.7
12:14:00 PM	72.4	72.7
12:15:00 PM	72.2	72.6
12:16:00 PM	72.9	72.6
12:17:00 PM	73.5	72.7

	ST-3	
Time	Leq	Running Avg
1:34:27 PM	64.7	64.7
1:35:00 PM	61.0	63.2
1:36:00 PM	66.4	64.6
1:37:00 PM	66.1	65.0
1:38:00 PM	62.0	64.5
1:39:00 PM	61.0	64.1
1:40:00 PM	65.4	64.3
1:41:00 PM	60.9	64.0
1:42:00 PM	59.8	63.7
1:43:00 PM	64.6	63.8
1:44:00 PM	65.3	64.0
1:45:00 PM	59.5	63.7
1:46:00 PM	60.0	63.5
1:47:00 PM	60.6	63.4
1:48:00 PM	60.4	63.2
1:49:00 PM	60.2	63.1
1:50:00 PM	60.5	63.0

	ST-2	
Time	Leq	Running Avg
12:50:15 PM	67.1	67.1
12:51:00 PM	67.0	67.1
12:52:00 PM	56.5	65.5
12:53:00 PM	56.6	64.4
12:54:00 PM	62.7	64.1
12:55:00 PM	59.7	63.6
12:56:00 PM	65.2	63.9
12:57:00 PM	65.1	64.1
12:58:00 PM	57.0	63.7
12:59:00 PM	56.9	63.3
1:00:00 PM	58.0	63.0
1:01:00 PM	59.0	62.8
1:02:00 PM	65.7	63.1
1:03:00 PM	55.8	62.8
1:04:00 PM	66.7	63.2
1:05:00 PM	57.6	63.0
1:06:00 PM	57.8	62.8
1:07:00 PM	59.2	62.7
1:08:00 PM	59.0	62.6
1:09:00 PM	58.1	62.4
1:10:00 PM	60.1	62.3
1:11:00 PM	61.1	62.3
1:12:00 PM	71.6	63.5
1:13:00 PM	77.9	66.7
1:14:00 PM	73.6	67.4
1:15:00 PM	59.9	67.2
1:16:00 PM	63.1	67.1
1:17:00 PM	60.8	67.0
1:18:00 PM	63.9	66.9
1:19:00 PM	65.5	66.9
1:20:00 PM	60.3	66.8
1:21:00 PM	66.6	66.8
1:22:00 PM	59.4	66.7
1:23:00 PM	62.3	66.6
1:24:00 PM	67.0	66.6
1:25:00 PM	72.4	66.9
1:26:00 PM	59.4	66.8
1:27:00 PM	61.1	66.7

	ST-4	
Time	Leq	Running Avg
2:27:00 PM	55.3	55.3
2:28:00 PM	55.4	55.4
2:29:00 PM	55.0	55.2
2:30:00 PM	54.9	55.1
2:31:00 PM	55.6	55.2
2:32:00 PM	56.5	55.5
2:33:00 PM	53.4	55.2
2:34:00 PM	57.9	55.7
2:35:00 PM	54.3	55.6
2:36:00 PM	54.3	55.4
2:37:00 PM	54.1	55.3
2:38:00 PM	54.4	55.3
2:39:00 PM	54.0	55.2
2:40:00 PM	55.4	55.2
2:41:00 PM	54.6	55.2
2:42:00 PM	55.4	55.2

	ST-5	
Time	Leq	Running Avg
2:48:00 PM	57.9	57.9
2:49:00 PM	58.4	58.2
2:50:00 PM	58.4	58.2
2:51:00 PM	58.7	58.4
2:52:00 PM	63.2	59.8
2:53:00 PM	62.3	60.4
2:54:00 PM	59.5	60.3
2:55:00 PM	59.5	60.2
2:56:00 PM	65.6*	60.2
2:57:00 PM	57.4	59.9
2:58:00 PM	58.8	59.8
2:59:00 PM	56.6	59.6
3:00:00 PM	59.1	59.6
3:01:00 PM	58.2	59.5
3:02:00 PM	59.0	59.5
3:03:00 PM	61.7	59.7
3:04:00 PM	57.8	59.6

*Level omitted due to School Bus Stop